

SCOPE OF SERVICES WATERSHED DIAGNOSTIC STUDY

LAKE AND RIVER ENHANCEMENT (LARE) PROGRAM IDNR DIVISION OF FISH AND WILDLIFE

I. Project Purposes:

The purposes of the Watershed Diagnostic Study are to:

1. Describe condition and trends in selected stream(s) and its (their) watershed(s)
2. Identify potential nonpoint source water quality problems
3. Prioritize potential watershed land treatment projects
4. Propose specific direction for future work
5. Predict and assess success factors for future work

II. Project Tasks:

The scope of services outlined below should be considered a draft that is subject to revision prior to the final contract, based on discussion with the LARE staff, sponsoring local agent, and participating SWCDs regarding cost-effectiveness of proposed services.

1. Summarize historical information on trends in land use and water quality

Compile an annotated bibliography of all previous studies pertinent to land use and water quality changes in the watershed, including data from volunteer monitoring. Briefly summarize pertinent information on climate, geologic history, topography, trends in land development, unique recreational resources related to the waterway or riparian areas, and water quality. Indicate the 14-digit Hydrologic Unit Codes (HUC) for the study area.

2. Map and describe current conditions

Present maps and describe current conditions in the stream's subwatersheds. Maps and descriptions may include the following:

- a. General location maps including watershed boundaries and the associated HUA codes
- b. Soil type descriptions and maps of Highly Erodible Land (HEL) and hydric soils;
- c. Current and historic extent of wetlands and potential wetland restoration sites;

- d. Floodplain management areas and condition of riparian zones indicating any significant locations possessing or requiring unusual bank protection;
- e. Significant natural areas;
- f. General locations of known state and federally listed species; and
- g. Land use information, such as the following:
 - 1) table of subwatershed acreages;
 - 2) land use categories by acreage and percent of watershed area;
 - 3) map of broad land use categories;
 - 4) development trends (changes in land use over time);
 - 5) history of any treatment plant dischargers (point sources) to inlet stream(s) (discharge data available from IDEM);
 - 6) history of pursuit of public access sites;
 - 7) location of large septic fields or industry;
 - 8) "hot spots" of damaging land use practices;
 - 9) number and type of animals in confined animal feeding operations;
 - 10) tillage transect data/trends in the county(s)

Note that land use information is to be reported at a relatively large resolution, not on a "field-by-field" basis. The written report should not include information that specifically identifies individual landowners in the text or photographs. All land use information should be collected and discussed with the sponsoring offices in the watershed prior to inclusion in draft reports that are circulated for public review.

3. Collect and analyze information on water quality, biology, and habitat

Conduct water quality tests at pertinent sites in selected streams and tributaries, as well as one reference site in a high quality similar watershed (approximately 5-10 sites total). Sites will be selected with input from staff of the LARE program, the watershed steering committee or other local sponsor, participating SWCDs, the USDA NRCS, the ISDA Division of Soil Conservation, affected municipalities, and IDNR District Fisheries and Nongame Biologists. At each site, collect and analyze data on water quality, biological communities, and habitat, as indicated in "a" through "d" below.

a. Water quality

- 1) Tributary sampling: Conduct tests at pertinent tributary sampling sites on physical and chemical water quality, including: pH, temperature, dissolved oxygen, nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen, total and dissolved phosphorus, turbidity, conductivity, and discharge. Fecal coliform as *E. coli* should be sampled at selected sites. Stormflow and baseflow samples should be collected at each tributary site. Site locations should be well documented on maps, with photos, latitude/longitude georeferencing, and GPS coordinates.
- 2) Quality assurance: Water quality analyses must be conducted by a reputable

laboratory and should follow analytical methods described in the most recent edition of one of the following publications:

(a) Standard Methods for the Examination of Water and Wastewater jointly published by the American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF). (Hyperlink: <http://www.standardmethods.org/>)

(b) Methods for the Chemical Analysis of Water and Wastes, US EPA, Environmental Monitoring and Support Laboratory. (EPA Publication # 600/4-79-020-Published March, 1983) Note: the web link to this document is very long:
<http://nepis.epa.gov/Exe/ZyNET.exe/30000Q10.PDF?ZyActionP=PDF&Client=EPA&Index=1976%20Thru%201980&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C76THRU80%5CTXT%5C00000001%5C30000Q10.txt&Query=600479020&FuzzyDegree=0&User=ANONYMOUS&Password=anonymous&QField=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&Docs=>

Water quality analyses must be conducted using detection limits appropriate for the analysis of stream water samples. The following detection limits are suggested for LARE projects:

<u>Parameter</u>	<u>Limits (mg/l)</u>
Total Phosphorus	0.01
Total Orthophosphorus	0.01
Ammonia Nitrogen	0.03
Nitrate Nitrogen	0.10
Total Kjeldahl Nitrogen	0.10
Total Suspended Solids	4

Quality assurance/quality control procedures (QA/QC) must be a part of the sampling and water quality analysis. A copy of the QA/QC plan from the laboratory(s) conducting the water and sediment sample analysis must be provided to the LARE program office in Indianapolis.

b. Biological community and habitat quality

1) A monitoring program should be developed using the same methods employed by the Indiana Department of Environmental Management and must be designed according to Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition (US EPA publication number EPA/440/4-89/001) (Hyperlink: <http://www.epa.gov/owow/monitoring/rbp/>). This should include:

- a) Bioassessment Protocol for benthic macroinvertebrates, using the single-habitat approach and consisting of identification at the family level for a 100-organism subsample for the riffle/run sample;

- b) Water quality evaluation, following the Water Quality section of the Field Data Sheet in the EPA manual;
 - c) A habitat evaluation, using the Qualitative Habitat Evaluation Index (QHEI) as used by the Indiana Department of Environmental Management and photographs of each sampling site which show relevant conditions of the site;
 - d) An analysis of the correlations between water chemistry, habitat and biotic scores.
- 2) Survey habitat quality using the Qualitative Habitat Evaluation Index (QHEI) once at each site, unless significant changes to habitat are expected (e.g., dredging, riparian clearing). Where indicated, contour sampling for sediment depth may be included at selected sites. Each tributary sampling site should be biologically monitored once between July 15 and November 30. Site locations should be well documented on maps, with photos and GPS coordinates.
- 3) A voucher collection will be submitted to IDNR Division of Fish and Wildlife at the same time as the draft report is submitted, allowing two months for review by IDNR or outside specialists. The collection will be forwarded to the Department of Entomology, Purdue University. A voucher for each taxon identified at each site will be curated according to Purdue's protocols for specimen handling, as follows:
- a) Use a 2 dram vial with a neoprene stopper and 70 to 80% ethyl alcohol;
 - b) Label format must include state, county, stream, location, date, collecting firm, contract or project number, voucher specimen;
 - c) Identification to lowest taxonomic level indicated for the protocol;
 - d) Vials tagged with two identification labels in the following format:
 - A. taxonomic name, the individual who identified the specimen, and the date, for example:

<u>Baetis flavistriga</u> Collected by: J. Doe October 2005
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- B. state and county where collected, exact location, date, collector, for example:

IN: Greene Co. Indian Creek at C.R.500N Date: 05-10-2006 Collected by: S. Beach

- e) Data sheet that indicates the number of individuals, taxon, location of collection, and vial number of voucher specimen.

A Scientific Purposes License is not needed to sample aquatic insects. A fishing license or Scientific Purposes License is needed to collect crayfish, depending on the number and manner in which the crayfish will be taken. The only mussels that can be taken or possessed without a Scientific Purposes License are Asiatic clams, quagga mussels and zebra mussels. Individuals should not touch a mussel, or even just a dead shell, unless

they know for sure that it is one of these three species listed above. Otherwise, a Scientific Purposes License is required to collect or possess a native mussel or dead shell.

For threatened and endangered species, adhere to the restrictions imposed by the Scientific Purposes License.

The study should include reports and brief analysis of surveys, trends, and management recommendations from other biological studies conducted in the stream and its tributaries. Information on the stream's fish community may be obtained from IDNR Division of Fish and Wildlife's Fish Management Reports or other sources. Macroinvertebrate data for selected Indiana streams is available from the Biological Studies Section of the Assessment Branch, Office of Water Quality, Indiana Department of Environmental Management. This data and a discussion of its significance for resource management should be included in the report as an indication of water quality trends in the study area.

d. Analyze trends relating physical, chemical, biological, and habitat factors
Use statistical analyses to predict the relationships between physical, chemical, habitat, and biological quality and indicate potential limiting factors. Indicate potential limiting factors. Describe trends in water quality, compare water quality with similar regional streams and set a reasonable goal for improvement in water quality factors.

4. Model nonpoint source pollution in subwatersheds

Use appropriate models to describe relative contributions to sediment and nutrient loads from identified or predicted sources of nonpoint pollution. Indicate the potential benefit derived from changes in land use practices. Various computer modeling methods are available and may be useful in describing changes. Intensive modeling programs may represent a higher level of resolution than is necessary for the purposes of this study. However, there may be smaller areas of particular interest where more intensive models would be appropriate.

5. Assess institutional resources

Describe the availability of watershed management and leadership resources, both human resources and existence of planning documents or land use management ordinances. Identify existing or recommend potential volunteer monitoring groups. Establish contacts with producer groups, environmental groups, developers, and land managers at public properties. Where possible, include pertinent reports on land use and water quality from these and other land management organizations in the watershed.

6. Prioritize potential projects

List and prioritize potential watershed land treatment projects that would contribute to decreases in degradation from nonpoint source pollution. Describe unusual physical or social characteristics of the subwatersheds or institutions that may support or challenge

future watershed projects. Include cost estimates and recommended timelines for implementation, as well as briefly listing potential sources of funding for projects. Identify motivating factors that would encourage voluntary participation of land users in future programs. Set specific goals or targets when possible.

7. Create a public information handout

Create and distribute an information handout that addresses factual issues concerning the state of the stream and costs or benefits predicted from the proposed project(s). The format of the handout should be tailored to the specific needs of the local sponsor, such as a 2-page flier, bi-fold brochure or magazine-style article.

8. Facilitate public meetings

Facilitate at least two (2) public meetings for the purposes of: 1) introducing the study, identifying stakeholders and obtaining public input, and 2) presenting the final report. Document meeting attendance, minutes, and public comments as an appendix to the report.

9. Report project progress

Issue monthly progress reports during the duration of the project. Copies of progress reports are to be submitted, at a minimum, to the project sponsor and LARE program staff prior to payment of invoices for the work described in the monthly reports. A listing of completed tasks and percentages in the invoice is not adequate as a monthly report. These reports should describe completed tasks, any unusual issues, and whether the anticipated timeline needs any modification, along with any other information pertinent for LARE staff review.

10. Complete watershed diagnostic study report

Complete a Watershed Diagnostic Study report including the following items at a minimum:

1. Executive Summary
2. Statement of project purpose
3. General overall project description
4. Heading, summary, discussion and recommendations for each project task with accompanying appendices, if necessary. Appendices should include (if applicable) but are not limited to:
 - a. All pertinent data, including field sheets
 - b. Water quality and index calculations
 - c. Computer model input and output
 - d. All pertinent project correspondence
 - e. Necessary maps, charts, graphs, computations and computational breakdowns

- f. Pertinent meeting minutes, attendance lists and an indication of the level of support for recommending particular implementation projects
5. Project conclusion

III. Data Presentation:

1. Where practical, the data should be presented clearly and concisely in the form of graphs and tables
2. Raw data sheets need not be bound into each copy of the report. However, at a minimum, one set of all laboratory and field data sheets must be forwarded to the LARE program office to aid in the review of the draft report
3. Figures should be incorporated into the main body of the report and not presented as attachments at the end of the report
4. Whenever possible, figures should be limited to 8 1/2" x 11" in size. In most cases, large-scale blueprint drawings and photos are not necessary
5. Present data in metric units with English units in parentheses. Example: 1.5m (5ft). Similarly, use common names for species with scientific names in parentheses or include a chart with all common and scientific names used in the document.

IV. Review Process:

1. Five printed copies and one digital copy of the draft report must be provided to the LARE program office for review by the LARE staff, SWCDs, and pertinent agencies and organizations at least two weeks prior to the final public meeting. The LARE staff will forward copies for review by other persons and agencies. *Note that the draft document will be posted on the LARE website for public comment.*
2. Both the draft and final reports should be reproduced with double-sided pages.
3. The title of the draft report should refer to the report as a "draft" version. Additionally, each page of the draft report and plan sheets should be labeled "Draft - Subject to Revision."
4. To facilitate review of the draft report, a meeting between a representative of the local sponsor organization, consultant, LARE staff, and other agency staff as needed may be held to discuss the review comments in conjunction with the final public meeting. The entire review process will be coordinated by LARE staff and normally takes at least eight weeks.
5. Upon addressing the review comments, five bound printed copies of the complete final report and plan sheets, plus an additional copy for each participating SWCD office, should be provided to the LARE office for distribution to each SWCD and other

participants involved in the watershed project. In addition, one unbound printed copy shall be provided to the LARE office, along with a single electronic file that contains the complete digital copy of the full report including appendices, figures, maps and photos in either Microsoft Word© or Adobe PDF© format that is internet-ready for enhanced public access to the information. Do not prepare multiple files that need to be merged into one file for web posting.

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